DOE/Golden Field Office • NREL • National Wind Technology Center

FIELD VERIFICATION PROJECT
FOR SMALL WIND TURBINES

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Whisper H40 Field Verification Project Tests

The National Renewable Energy Laboratory's (NREL's) National Wind Technology Center (NWTC) has completed the following Field Verification Project (FVP) tests for the Whisper H40: power performance test, acoustic noise test, duration test, and safety and function test. A discussion follows.

Turbine Description

The Whisper H40 is a three-bladed, upwind, variable-speed turbine that uses furling for power regulation and overspeed control. It has a rotor diameter of 2.1 meters and a manufacturer's peak power rating of 900 watts. Figure 1 shows the Whisper H40 wind turbine as it was installed at the NWTC. The turbine was installed on a 30-ft. guyed tubular tilt-up tower, which can be easily lowered to ground level for turbine inspection and maintenance.

Figure 1. The Whisper H40 test turbine at the National Wind Technology Center, Boulder, Colorado.

The turbine uses a direct-drive, permanent magnet, brushless alternator to produce three-phase, variable-frequency, variable-voltage power. This "wild AC" power is directed through slip rings in the nacelle and down the tower to the turbine's EZ-Wire controller.

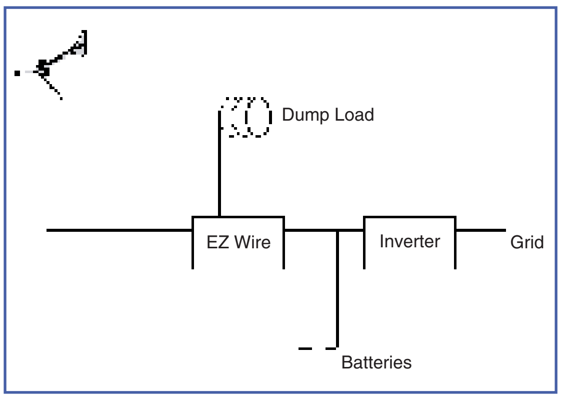

Figure 2. Schematic electrical layout of the Whisper H40 at the National Wind Technology Center, Boulder, Colorado.

The EZ Wire is a proprietary, silicone controlled rectifier that features turbine control and a dump load. In these tests, it was configured to produce 24 volts DC, stabilized with four batteries. A Trace SW4024 sine-wave inverter converts the DC power to 120 volts AC and feeds it to the NWTC electrical grid. In case of a utility outage or inverter failure, a resistive dump load dissipates energy from the turbine. A manual switch provides braking for the turbine by disconnecting it from the load and shorting two of the generator leads together. Figure 2 depicts an electrical schematic of the turbine's set up.

Power Performance Test

Power performance was measured using both the power on the DC bus (before the inverter) and the power output by the inverter to the grid. Figure 3 shows the AC power curve after the inverter at the NWTC site with an average air density of 1.007 kg/m^3. The power curve stops at 21.5 m/s because that was the highest wind speed bin with sufficient data available. This power curve was collected per the IEC test protocol, including 10-minute averages of the wind speed and power.

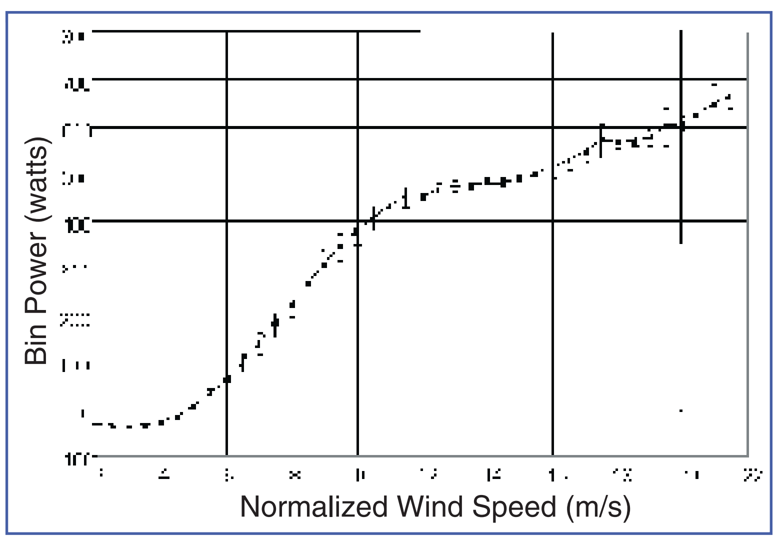

Figure 3. AC power curve at site average air density 1.007 kg/m^3.

Air Density Note

Air density influences the amount of energy a wind turbine will capture from the wind. In general, a higher air density will result in more energy. These higher density sites are typically found at lower elevations.

Table 1 gives the Annual Energy Production (AEP), which is calculated in accordance with the power performance test standard IEC61400-12[1]. It should be noted that both the power curve and AEP numbers are given for the NWTC site average air density. Because the NWTC is located at 6,000 ft, the air density is relatively low. In general, more energy can be expected with a higher air density.

Table 1. **AC Annual Energy Production (AEP) at Site Average Density 1.007 kg/m3**

Cut-Out Wind Speed: 25 m/s (extrapolation by constant power from last bin)					
Hub Height Annual Ave. Wind Speed	AEP-Measured (from measured power curve)		Uncertainty of AEP-Measured		AEP-Extrapolated (from extrapolated power curve)
(m/s)	(kWh/yr)		(kWh/yr)	(%)	(kWh/yr)
4	104	Complete	72	69.6	104
5	511	Complete	102	20.0	511
6	963	Complete	122	12.6	963
7	1,403	Complete	132	9.4	1,406
8	1,797	Complete	138	7.7	1,814
9	2,124	Complete	140	6.6	2,176
10	2,371	Complete	140	5.9	2,482
11	2,537	Incomplete	138	5.4	2,725

Acoustic Noise Test

Acoustic noise tests were performed in accordance with acoustic noise testing standard IEC 61400-11[2] to determine the sound power level (source strength), directivity, and tonality of the Whisper H40. Measurements showed that the background noise level at the test site and noise level with the turbine running were close. Figure 4 shows the binned sound pressure levels and the difference between turbine noise and background noise as a function of wind speed. The apparent sound power level at 8 m/s was found to be 85.3 dB(A).

For winds above 8 m/s, the differences between background noise level and turbine noise level were between 3 dB(A) and 6 dB(A); no sound power level or directivity could be reported. A spectral analysis of the turbine noise showed no tones were present. The complete noise test report is available from Southwest Windpower's Web site at www.windenergy.com/SUPPORT/downloads.html.

Sound Power vs. Sound Pressure Levels Note

Both terms are used to express the noise production of wind turbines, and even though they are both expressed in dB(A)s, the numbers are very different. The sound power level of a turbine is a measure of the acoustic source strength. Sound pressure level, on the other hand, is the noise level at a certain distance from that source. Therefore sound pressure levels should always be given with a distance to the source; otherwise the number is meaningless.

Typical sound power levels for large turbines are in the order of 95-105 dB(A). Sound pressure levels at houses next to turbines are usually not allowed to be higher than 40 dB(A).

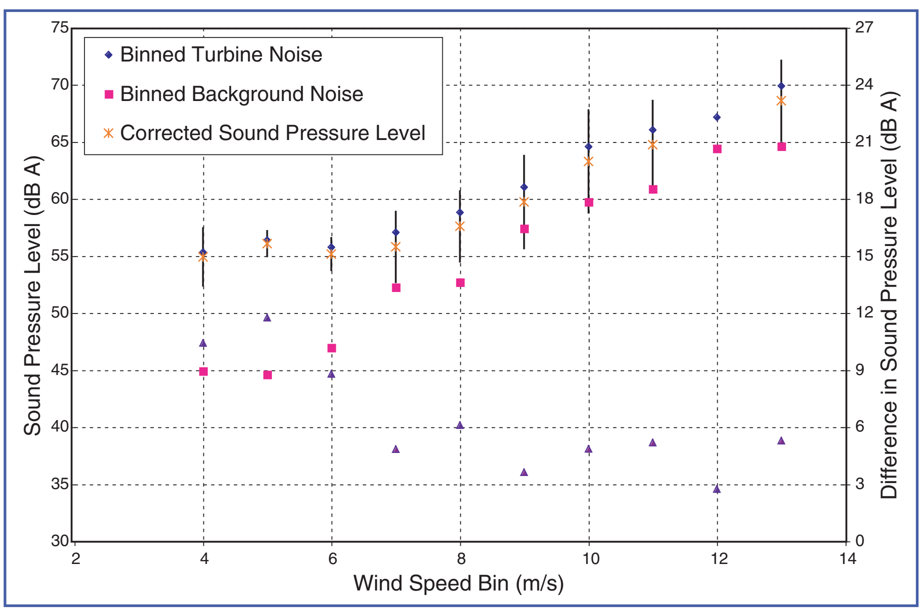

Figure 4. Binned sound pressure levels as a function of wind speed. Measured 13.6 m from the rotor center.

1 IEC 61400-12; "Wind turbine generator systems – Part 12: Wind turbine power performance testing," first edition; 1998-02.
2 IEC 61400-11; "Wind turbine generator systems – Part 11: Acoustic noise measuring techniques," first edition; 1998-09.

Duration Test

The duration test was started on March 10, 2000, and completed on May 31, 2001. The full duration test report will be available on the FVP Web site in the future. The Whisper H40 met all test requirements. The results and the test requirements (from the draft small turbine safety standard IEC 61400-2 ed.2[3]) are given in Table 2.

Table 2. Duration Test Results

	Requirement	Actual
Total operating time	6 months	14.7 months
Total power production time	3,000 hours	3,107 hours
Power production in moderate and high winds (Vwind>10 m/s)	250 hours	312 hours
Power production in high winds (Vwind>15 m/s)	25 hours	68 hours
Maximum 3-sec gust	—	41 m/s

As part of the duration test, the turbine underwent a detailed tear-down inspection after the field testing was completed. The turbine was taken apart and inspected for hidden degradation, wear, etc. Some of the observations were:

- The nose cone was cracked.
- The magnet can had been rubbing against the generator windings (see Figure 5).
- One slipring channel no longer functioned.
- The set screw holding the upper casting in place showed wear.

As part of the electrical inspection, thermal images were taken of the electrical system (EZ-Wire cabinet, dump load, and battery bank). Because the camera had not been calibrated, only indicative temperatures could be obtained. No hard conclusions were drawn. Figure 6 shows a normal image, and Figure 7 shows a thermal image of the EZ-Wire cabinet while the turbine was operating in 15-20 m/s winds. In Figure 7, the red color indicates temperatures around 150°F (66°C), and the white spots indicate higher temperatures.

Figure 5. The inside of the magnet can.

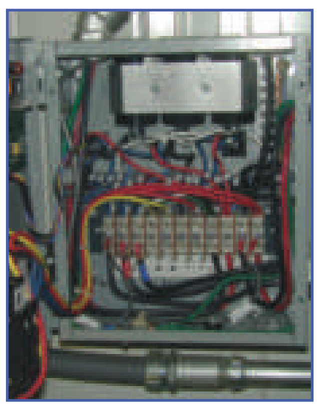

Figure 6. The inside of the EZ Wire.

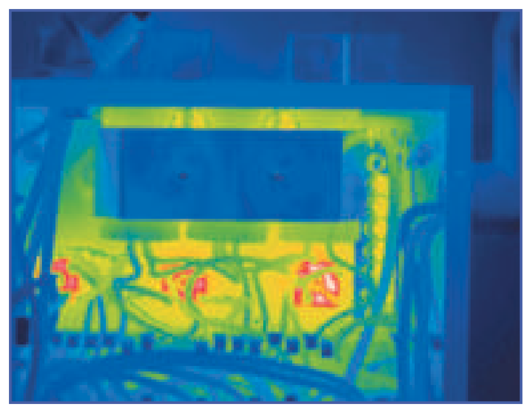

Figure 7. Thermal image of the upper part of the EZ-Wire controller.

Safety and Function Test

For the safety and function test, NREL determined whether the turbine displayed its designed behavior and whether the turbine's safety system confines the turbine to its design limits. The following items were tested: yaw orientation, power limitation, rotor speed limitation, brake operation, grid outage, battery disconnect, loss of electrical load, unauthorized changing of control settings, electrical safety, and lightning protection.

No abnormalities were observed. More details on this test can be found in the publicly available report: NREL/TP-500-31666, "Wind Turbine Generator System Safety and Function Test Report for the Southwest Windpower H40 Wind Turbine," which can be downloaded from NREL's Web site at www.nrel.gov/publications/.

Results from other turbines tested at the NWTC site can be found on the back page.

[3] IEC 61400-2; "Wind turbine generator systems – Part 2: Safety of small wind turbines," second edition draft.

Host Sites

The five recipient organizations manage 13 sites. Figure 8 and Table 3 show the names of the organizations and contacts, locations, turbine types, applications, and the dates the turbines were commissioned.

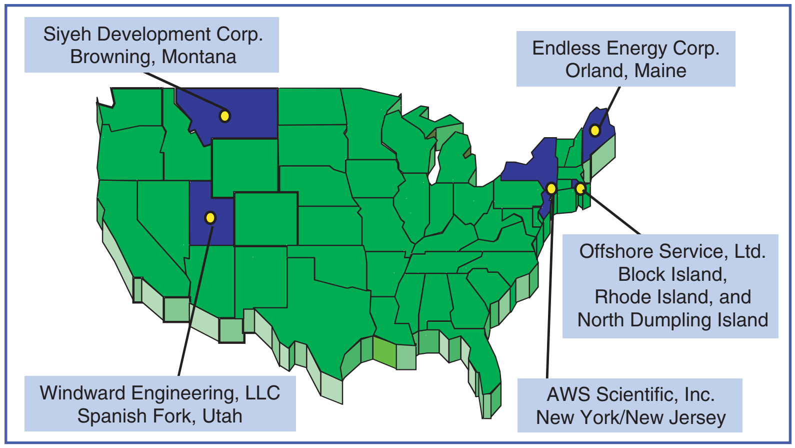

Figure 8. DOE Field Verification Project turbine locations.

Table 3. Field Verification Project Locations and Participating Organizations

Organization/Contact	SWT #	Turbine Location	Quantity/Type of Turbine	Application	Date Commissioned
Windward Engineering 4661 Holly Lane Salt Lake City, UT 84117 Contact: Craig Hansen/Dean Davis	Turbine #1	Spanish Fork, Utah	One Whisper H40 (previously named Whisper 900)	Grid Connected	February 26, 2000
Endless Energy Corporation 57 Ryder Road Yarmouth, ME 04096 Contact: Harley C. Lee/Michael Boice	Turbine #1	Allen Blueberry Plant, Orland, Maine	One AOC 15/50	Grid Connected	February 14, 2001
	Turbine #2	TBD	One AOC 15/50	Grid Connected	
Siyeh Development Corporation P.O. Box 1989 Browning, MT 59417 Contact: Dennis Fitzpatrick	Turbines #1–4	Waste Water Treatment Facility, Browning, Montana	Four Bergey Excel—S/E 10 kW	Pumping and Purification	October 2000
Offshore Service, Ltd. P.O. Box 457 Block Island, RI 02807 Contact: Henry G. duPont	Turbine #1	Block Island Goose and Garden Greenhouse, Block Island, Rhode Island	One Bergey Excel/R 7.5 kW	Residential Consumption	June 2, 2000
	Turbine #2	North Dumpling Island	One Bergey Excel—S/E 10 kW	Residential Consumption	June 20, 2001
	Turbine #3	TBD	One Bergey Excel—S/E 10 kW	Residential Consumption	
	Turbine #4	TBD	One Bergey Excel—S/E 10 kW	Residential Consumption	
	Turbine #5	Jonathan & Jo-An Evans Residence Block Island, Rhode Island	One Bergey Excel—S/E 10 kW	Residential Consumption	August 23, 2000
AWS Scientific, Inc. 251 Fuller Road Albany, NY 12203-3656 Contact: Bob Putnam/Dan Bernadett	Turbine #1	Webster, New York	One Bergey Excel—S/E 10 kW	Distributed Generation	June 1, 2001
	Turbine #2	Liberty Science Center Jersey City, New Jersey	One Bergey Excel—S/E 10 kW	Distributed Generation	April 22, 2001
	Turbine #3	Southhampton College Long Island, New York	One Bergey Excel—S/E 10 kW	Distributed Generation	
	Turbine #4	Peconic Land Trust's North Fork Stewardship Center Long Island, New York	One Bergey Excel—S/E 10 kW	Distributed Generation	

Third Quarter Statistics Summary

Table 4 shows the summary statistics for all FVP host sites. There are no corrections to these data for sea-level air density. These data are presented as they were reported by the host site organizations.

Table 4. Project Summaries

		Cumulative since commission	Quarterly Statistics						
	Recipient Host Site	kWh Total	kWh /m^2	Capacity Factor	Unavailable Hours	Turbine Availability	Max Power (kW)**	Concurrent Wind Speed at Hub Height (m/s)***	Average Wind Speed (m/s)
Whisper H40	Windward Engineering Spanish Fork, UT	2,380.0	134.7	24%	124.0	100%	0.61	12.2	6.8
AOC 15/50	Endless Energy Allen Blueberry Plant Orland, ME	67,685.5	*	*	*	*	*	*	*
Bergey Excel	Siyeh Development Waste Water Treatment Facility, Browning, MT								
	Turbine #1	*	*	*	*	*	*	*	*
	Turbine #2	*	*	*	*	*	*	*	*
	Turbine #3	*	*	*	*	*	*	*	*
	Turbine #4	*	*	*	*	*	*	*	*
	Offshore Services Block Island Goose & Garden Greenhouse Block Island, RI	8,254.2	*	*	*	*	*	10.1	5.0
	Jonathan & Jo-An Evans Residence Block Island, RI	3,566.9	12.2	9%	*	*	9.0	10.9	4.6
	North Dumpling Isle.	1,032.0	26.1	6%	*	*	3.7	11.8	4.4
	AWS Scientific Webster, NY	1,842.6	38.3	6.8%	*	100%	8.0	13.6	4.4
	Liberty Science Center, NJ	1,166.7	18.3	3.2%	*	100%	7.4	11.3	3.4

* **Data not available for reporting.**
** **Maximum power is the peak 10-minute average output.**
*** **The concurrent wind speed is a 10-minute average wind speed.**

Figure 9 shows the power curves for each host site with a Bergey Excel turbine. These power curves are presented here for comparison only. There is no guarantee for accuracy; nor should the reader imply that these are certified power curves. No corrections have been made for air density, anemometer location, or height (compared to the turbine rotor height), etc. Also, the Goose and Garden site is using the Bergey Excel turbine in a battery charging application. Based on past research, battery charging applications produce a lower power curve than turbines connected to the utility grid. Note that we have reported these data from the Siyeh site, but there appears to be measurement error at the lower wind speeds. This source of error is unknown, but the data are reported as measured.

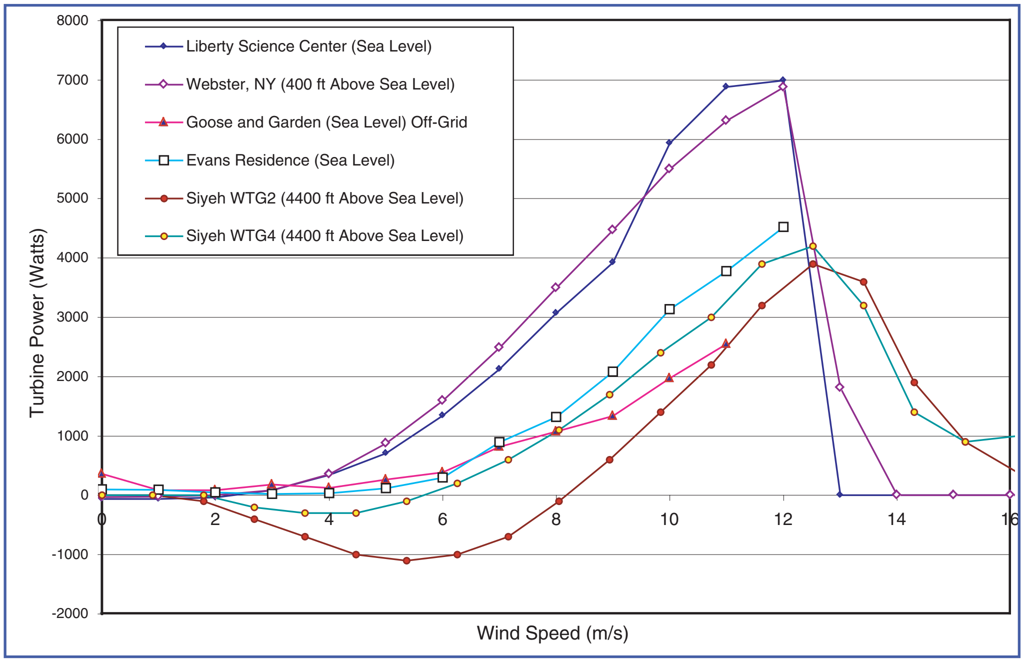

Figure 9. Comparative power curves for Bergey Excel turbines.

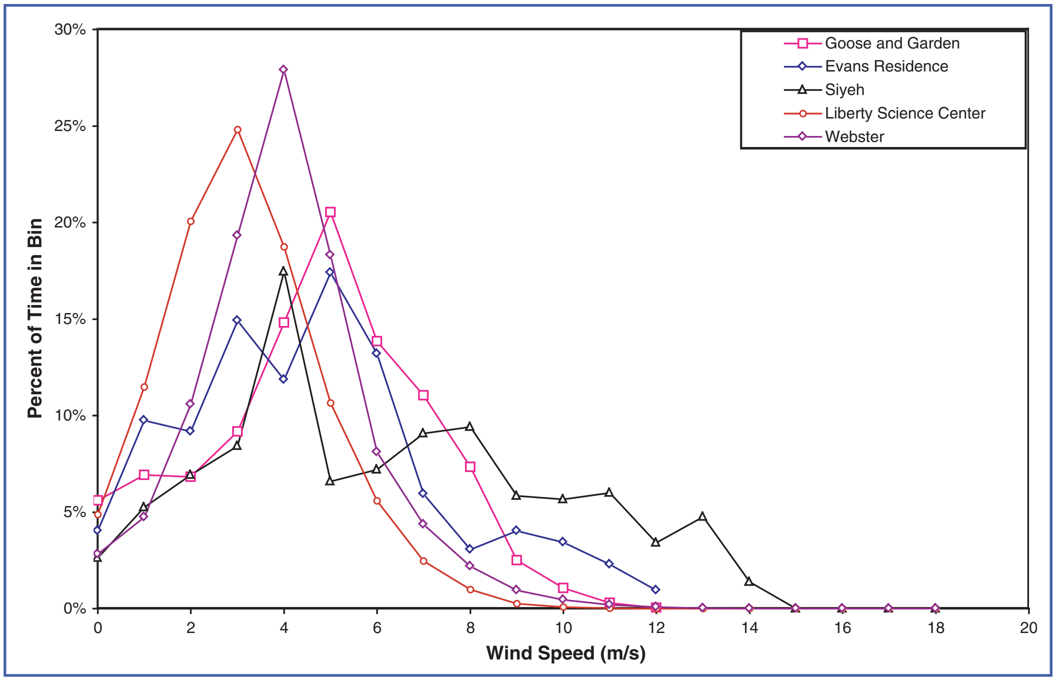

Figure 10 shows the wind speed distributions at each of the host sites with a Bergey Excel turbine where power curve data are shown.

Figure 10. Wind speed distributions for Bergey XL turbines.

Figure 11 shows the power curve for the Whisper H40 located in Spanish Fork, Utah. This is the only host site using this turbine, so there is only one power curve. Note that the Windward Engineering tables and figures report the measured power data. Power curves are not corrected to sea-level air density unless otherwise noted. The elevation at Spanish Fork, Utah, is 4,800 ft. The corresponding wind speed distribution for the Spanish Fork site can be found in Figure 12.

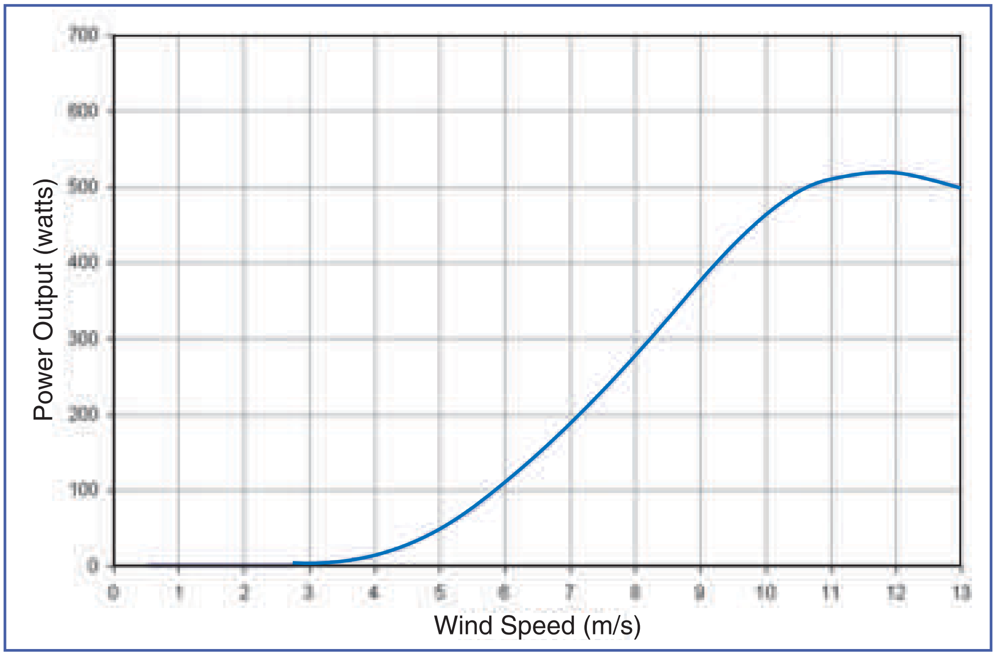

Figure 11. Whisper H40 power curve at site average air density of 1.021 kg/m3.

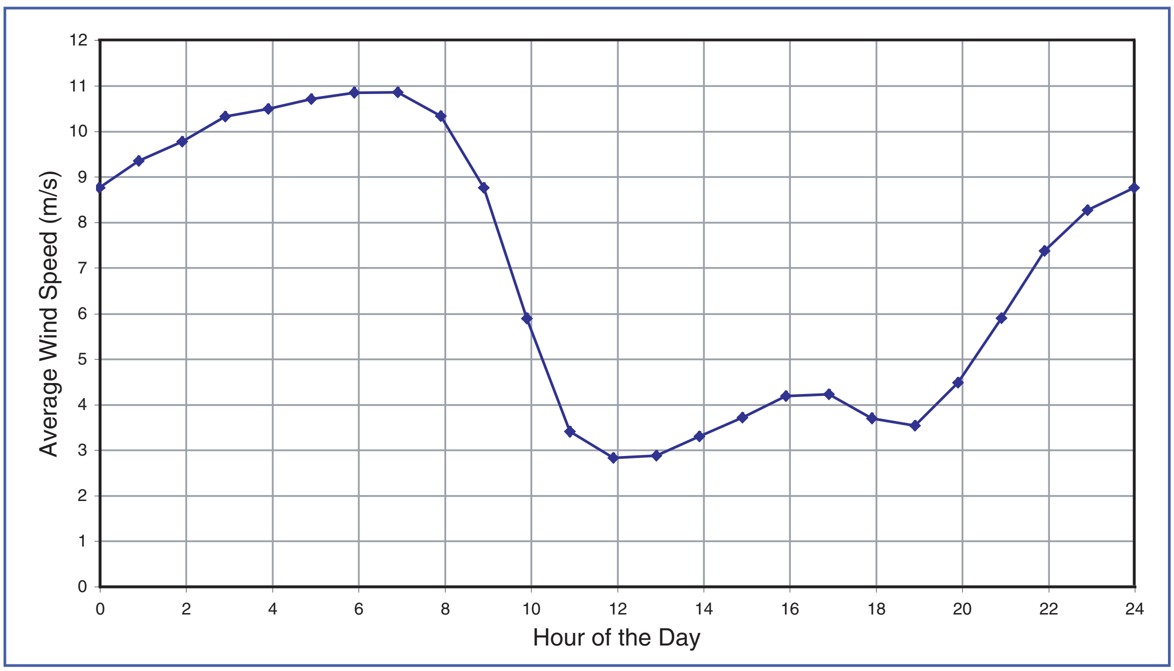

Figure 12. Wind speed distribution for Spanish Fork, Utah.

Third Quarter Status Summary
Windward Engineering, LLC

Spanish Fork, Utah

The Whisper H40 (Figure 13) is currently in the testing stage in Spanish Fork, Utah. Since its commissioning in February 2000, the turbine has produced a total of 2,380 kWh, of which 1,831 kWh have been sold to the utility grid, which is equal to a 77% inverter efficiency.

For the quarter ending September 30, 2001, the Whisper H40 ran normally with complete data acquisition systems (DASs) operational. It produced 482 kWh (384.8 kWh of which were sold to the grid), at an average wind speed of 6.8 m/s. The turbine operated with 100% turbine availability and 94.4% system availability. The lesser system availability was caused by modifications to the DAS for upcoming loads measurements. Windward also experienced one unusual event this past quarter: The NRG data logger time stamp was scrambled, and as a result, was set back about 14 hours during the modifications to the LabView DAS. The exact cause of this problem is unknown, but it is thought to be associated with some electrical power spike or noise. The time stamp was corrected at the end of September, and there does not appear to be any negative impact on the data because of this event. However, the time stamp will need to be reset in November, and the October data will need to be corrected accordingly.

Please refer to Table 4 to see the test results of the Whisper H40 at the site in Spanish Fork.

Figure 13. Whisper H40 at the host site, Spanish Fork, Utah.

Endless Energy Corporation

The goal of the Endless Energy project is to verify the performance of the AOC 15/50 turbine under coastal conditions and to create a model for commercially competitive wind power installations at small, distributed sites. As part of this project, an AOC 15/50 was installed at G.M. Allen & Son, a blueberry processing plant located in Orland, Maine. A second site on Monhegan Island, Rockland, Maine, is still in the planning stages.

Figure 14. AOC 15/50 at the Allen Blueberry Plant, Orland, Maine.

Allen Blueberry Plant, Orland, Maine

The AOC 15/50 (Figure 14) in Orland is currently operating under a net billing agreement. Production data were collected on July 18, 2001 and September 26, 2001. Also during the third quarter: An informational sign to be posted near the turbine was delivered, and the DAS is undergoing an equipment upgrade to render it operational.

Alternate Site 1-project still in planning process

Siyeh Development Corporation

Waste Water Treatment Facility, Browning, Montana

This project is located in Browning, Montana, at the Town of Browning's Waste Water Treatment Facility. Siyeh, in partnership with the Town of Browning, Bergey Windpower, the Indian Health Service, and the Blackfeet Indian Housing Authority, installed four Bergey Excel S/E 10-kW turbines (Figure 15), commissioned in October of 2000.

Figure 15. One of the four Bergey Excel 10-kW wind turbines in Browning, Montana.

Several steps were highlighted for completion in the previous Quarterly Report, including: 1) perform data collection of the wind conditions and the turbine system output at the site; 2) work with Trace Technologies on the ongoing retrofit of the inverters; and 3) repair the furling mechanism on turbine #4. During the past quarter, data collection on the two turbines with operable inverters has continued, and the two inoperable inverters were repaired and installed on site by Trace Technologies. The furling mechanism on turbine #4 has not yet been repaired.

The goals for the next quarter include: 1) perform data collection of the site wind conditions and the turbine system; and 2) repair the furling mechanism on turbine #4.

Please see Table 4 for test results of the four Bergey Excel 10-kW turbines at the Town of Browning Waste Water Treatment Facility.

Offshore Services, Ltd.

The goals of this project include the installation and monitoring of five Bergey Excel wind turbines. Past quarterly reports for this project have indicated serious difficulties in siting and permitting the turbines. However, in this quarterly report, these problems seem to have been resolved. Operating sites include Block Island Goose and Garden Greenhouse (commissioned June 2, 2000), which also operates an electric vehicle; Jonathan and Jo-An Evans' residence (commissioned August 23, 2000); and North Dumpling Island (commissioned June 20, 2001). Two more project sites are still in the development stage: Twenty-three acres owned by a group of five neighbors who would like to host a turbine, and the Block Island Airport Site.

Block Island Goose and Garden Greenhouse, Block Island, Rhode Island

Figure 16. The Bergey 7.5-kW Excel/R, Block Island, Rhode Island.

This site runs a Bergey 7.5-kW Excel/R (Figure 16), which is identical to the Bergey 10-kW turbine but designed to generate power with battery charging electronics, which decreases the top end of the power production to 7.5 kW, instead of 10 kW. In past periods, Offshore Services experienced problems with the 4:1 wind turbine transformer because it runs hot in high winds.

During this reporting period, a severe thunderstorm on July 1, 2001, damaged the electronic control boards in the DC-AC inverters and caused the 4:1 wind turbine transformer to short-circuit. Two new inverter cards were purchased at the cost of $832 each, and a new transformer was ordered and installed, the cost of which was covered by the warranty (the value is estimated to be $1,200). The new transformer is larger, heavier, and more robust, and it runs cooler when loaded by the wind turbine. However, Offshore has yet to analyze the power vs. wind data to determine the effect of the new transformer on the light wind and heavy wind performance. Other than the lightning damage to the transformer and the inverter control cards, the Block Island Goose and Garden Greenhouse has experienced no other operational problems.

The winds during this period appear to have been lighter than usual. The 7.5-kW backup generator ran several times, and the turbine only produced more power than the facility could use on a few occasions. Although two 2.5-kW water heating coils were installed in the wood/coal hot water furnace to keep the wind turbine loaded in windy conditions, the wind resource was insufficient to fully test them.

Offshore Services, Ltd.

Block Island Goose and Garden Greenhouse, Block Island, Rhode Island-Continued

The leased Ford Electric Ranger pick-up truck, which is charged with power from the wind turbine, adds flexibility to the wind/battery system by increasing the storage capacity of the system in windy conditions. The vehicle has driven just over 7,000 miles since May 2000 (1,000 miles since the last quarterly report), displacing 500 gallons of gasoline (71 gallons since the last quarterly report) and a number of tons of greenhouse gases that otherwise would have been produced by a conventional fossil-fueled vehicle.

Jonathan & Jo-An Evans Residence, Block Island, Rhode Island

Although the Evans' have faced many problems in the past quarters, including public opposition to the installation of the wind turbine on their property and a tower guy failure, the turbine was re-commissioned in June 2001 and is now awaiting a set of new blades. The new blades have been tested by Bergey and are intended to significantly reduce the turbine's operating noise. They will be installed in the fall of 2001. The turbine (Figure 17) generated 1,183 kWh of power this quarter, and 388 kWh were sold back to the utility under the Public Utility Regulatory Policies Act (PURPA).

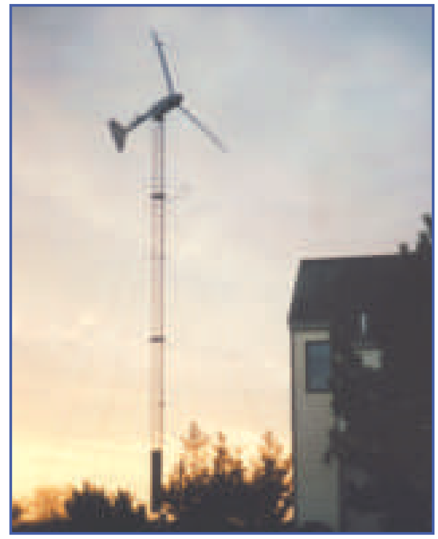

Figure 17. The Bergey Excel 10-kW wind turbine at the Evans Residence, Block Island, Rhode Island.

Alternate Site 1, North Dumpling Island near Fishers Island, New York-project still in planning process

The newest site of Offshore Services projects, North Dumpling Island, is located north of Fishers Island, New York, south of Groton Long Point, Connecticut, and 23 miles west of Block Island, Rhode Island. This site replaced the prospective site at High View Hotel, which replaced the prospective site at the Littlefield residence. The new site on North Dumpling Island was chosen because of the lack of neighbors within a mile, grid-connected load, and a location that will test the ability of the Bergey 10 kW to operate in a severe marine environment. Last quarter, the lease agreement was signed by the owner of the island, Dean Kaman, and the turbine was installed on the island and commissioned on June 20, 2001. Because the turbine was installed on the same tower as another Bergey 10 kW that was installed on the island in 1987, but which was inoperable due to tail boom failure and excessive wear, there was no need to obtain permits or approvals. A new Xantrex-Trace 10-kW inverter, wind vane, anemometer, current transducer, and Second Wind "Nomad" data logger were also installed for data acquisition and monitoring. The turbine is currently operating without any problems.

Alternate Site 2, Block Island, Rhode Island-project still in planning process

A group of five neighbors who collectively own 23 contiguous acres has expressed interest in hosting a turbine and participating in the program. This neighborhood group will replace the municipal site previously submitted to DOE in the original proposal.

Last quarter the group members, led by Richard Batchelder, signed an agreement to participate in the program, and Offshore Services applied for a building permit. Permitting for the turbine is expected to be completed in the winter of 2001.

Alternate Site 3, Block Island, Rhode Island-project still in planning process

This site replaces the previous proposed site in the town of New Shoreham at the Block Island School, which failed to complete the permitting stage due to lack of support from the school administration. The Block Island Airport is a 370-acre site that meets all the requirements of the new zoning law and is already affected by significant noise and visual impacts (which lessens or eliminates the possibility of neighbors complaining about these issues as they pertain to the wind turbine, as has happened in the past). The turbine would generate approximately 40% of the power used by the airport facility.

In the last quarterly report, it was stated that meetings with the State Airport Planning Department had led to a siting review, slated to be completed in September 2001; however, this review has been postponed until November 2001 due to the attacks on September 11th, which have affected airport planners everywhere.

AWS Scientific, Inc.

AWS Scientific is in charge of four projects, two of which are currently operating: one in Webster, New York, and the other at Liberty Science Center in Jersey City, New Jersey. AWS is also involved in negotiations to install a third turbine at Southampton College and a fourth at Peconic Land Trust's North Fork Stewardship Center, Long Island, New York.

Webster, New York

The turbine in Webster, New York, (Figure 18) was in service for 2,208 hours during the third quarter, achieving a wind turbine system availability of 100% and avoiding unavailable time events. Energy production topped off at 1,474 kWh, for a capacity factor of 6.8%. Please see Table 4 for further details.

Figure 18. The Bergey Excel 10-kW wind turbine in Webster, New York.

Liberty Science Center, Jersey City, New Jersey

The turbine at Liberty Science Center (Figure 19) was in service for a total of 2,208 hours during the third quarter, achieving a wind turbine system availability of 100% and avoiding unavailable time events completely. Energy production reached 702.9 kWh, which is equal to a capacity factor of 3.2%.

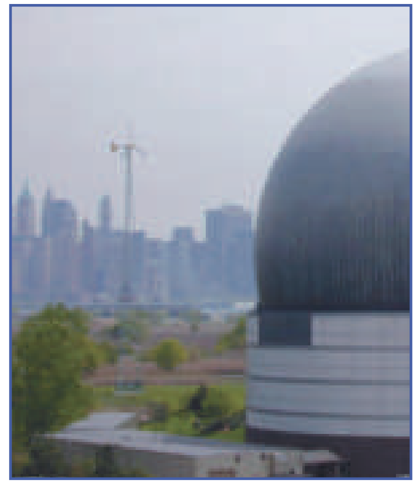

Figure 19. The Bergey Excel 10-kW wind turbine at the Liberty Science Center, Jersey City, New Jersey.

Alternate Site 1, Southampton College, Long Island, New York-project still in planning process

Progress continues on the preparation for the installation of a turbine at Southampton College. On September 27, 2001, the Town of Southampton's Planning board passed a resolution assuming lead agency status under the State Environmental Quality Review Act. After considering the visual and noise impacts of the proposed installation, the board decided that the installation will not have a significant effect on the environment and that it is not necessary to prepare a Draft Environmental Impact Statement. The same board is scheduled to make a decision on October 18, 2001, on the height variance application for the proposed tower installation.

In addition to waiting for the decision on the height variance, AWS Scientific is finalizing altered interconnection plans for the Southampton College site. Because of New York State's Standard Interconnection Requirements, it is necessary to develop alternative interconnection plans for Southampton College and the Peconic Land Trust installation. As stated in the last quarterly report, Keyspan Electric Services, LLC, and AWS are scheduled to complete this task, and it is currently underway.

Another subcontract is on track with Ryan-Biggs Associates, P.C., to certify that the tower to be installed at Southampton College is compliant with the wind load requirements of the New York State Building Construction Code, which is a requirement set by the Southampton Town Zoning Code. The estimated cost of this subcontract is $4,000, which will be covered by the Long Island Power Authority because it is outside of the original budget.

Alternate Site 2, Peconic Land Trust's North Fork Stewardship Center, Long Island, New York-project still in planning process

Progress on the fourth site, located at Peconic Land Trust's North Fork Stewardship Center, continues. As stated in the last quarterly report, AWS Scientific is working to establish a professional and technical services agreement with Peconic Land Trust, while at the same time attempting to address permitting and approval issues. Additional sources of funding to cover the costs of the self-supporting tower, concrete and rebar, fencing, and installation labor that are required for the site at the North Fork Stewardship Center site are still under consideration.

Testing at the NWTC

AOC 15/50

Duration, power performance, and noise tests have been completed on this turbine. The safety and function test is planned after the turbine controller is upgraded to the new production configuration. The production configuration is undergoing review by Underwriters Laboratories and may be modified before installation at the NWTC.

Bergey Excel 10 kW

The duration test of the Bergey turbine continued this quarter. At the end of September, the turbine had run for 1,606 hours with 127 hours above 10.2 m/s winds and 18 hours above 15.3 m/s winds. During this quarter, the maximum 3-second gust was only 26.6 m/s, compared to 43.7 m/s (the maximum seen for this test in April 2001). The average turbulence intensity in 15 m/s winds was 16.9%, compared to the maximum of the test of 17.5%. Operational time fraction was low for much of the period because of DC bus overvoltage faults and a control card failure. However, by September these problems had apparently been resolved, and an operational time fraction of 100% was recorded.

Noise testing is planned for NWTC's windy season that normally begins in October. Although some power performance data are being collected as part of the duration test, the power performance test will not be completed until high winds occur later this year.

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By the
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